

Network Measurements Working Group

A Survey of Network Measurement Tools and their Mapping to the Characteristics Hierarchy

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Verifying the Characteristics Hierarchy

- The “hierarchy document” describes network characteristics.
- But: are we doing the right thing?
- Are we missing anything important?



A Survey of Network Measurement Tools

*Network performance measurement tools
a comprehensive comparison,*
Rody Schoonderwoerd,
M.Sc. thesis, Nov. 2002, Vrije Universiteit.

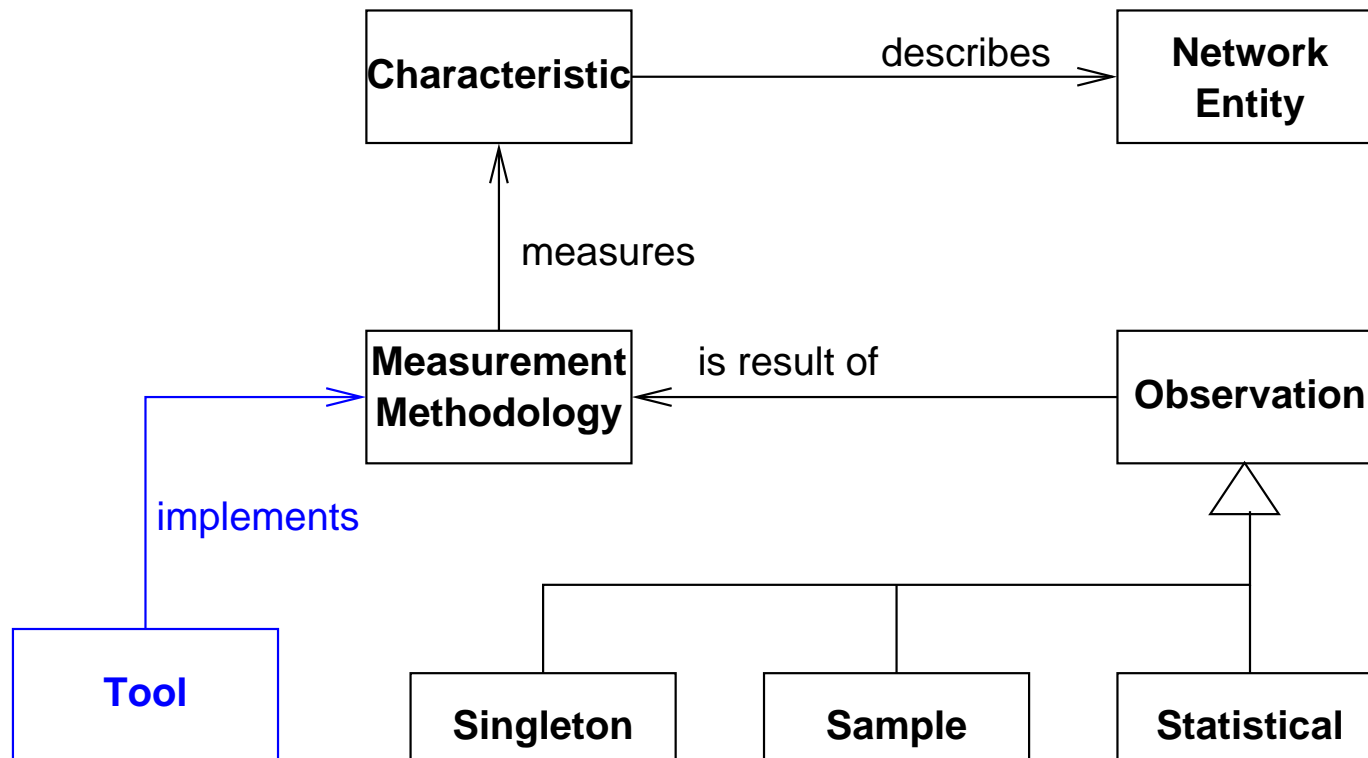
available via:

<http://www.cs.vu.nl/albatross/>

<http://www-didc.lbl.gov/NMWG/>



Tools and the Hierarchy



Topics of the Tools Study

- 18 tools
- the characteristics measured
- the measurement methodology
- per-path or per-hop
- precision and intrusiveness



The Tools we looked at

bing

bprobe

cprobe

clink

Iperf

netest

Netperf

Nettimer

pathchar

pathload

pathrate

pchar

pipechar

ping

sprobe

traceroute

TReno

ttcp



The Tools we did NOT look at

- udpmon
- your favourite tool
- things we simply were not aware of

Disclaimer:

1. Our list of tools is necessarily incomplete.
2. We are happy to add more, *if they measure something not covered so far.*



Measurement Methodologies Encountered

- variable packet size
- packet pair
- packet train
- packet pair with tailgating
- path flooding
- SLOPS (Self-Loading Periodic Streams)
- ICMP Echo
- varied TTL
- TCP simulation



Precision and Intrusiveness

- We measured between a few Linux sites
- Observed precision and intrusiveness varies a lot (some techniques obviously get to their limits with Gbit-links)
- Results are in the M.Sc. thesis
- Scientifically sound statements need more experimental work



Characteristics Measured

Capacity	Bandwidth		Achievable	Delay		Hoplist
	Utilized	Available		Round-trip	Loss	
bing	cprobe	netest	Iperf	bing	bing	traceroute
bprobe		pathload	netest	clink	netest	
clink		pipechar	Netperf	netest	pathchar	
Nettimer		TReno	ttcp	pathchar	pchar	
pathchar				pchar	pipechar	
pathrate				pipechar	ping	
pchar				ping		
sprobe						



Per-Path vs. Per-Hop

Per-Path	Per-Hop
bing, bprobe	clink
cprobe, Iperf	pathchar
netest, Netperf	pchar
Nettimer, pathload	pipechar
pathrate, ping	
sprobe, traceroute	
TReno, ttcp	

(“Hop” refers to the IP level)



Observations

- For the tools we investigated, we can express *what* they measure using our hierarchy
- Some characteristics from the hierarchy are not covered (One-way delay, Queue Forwarding, Availability, . . .)
- No real mismatch was detected between tools and the hierarchy

Anything we overlooked ?



How to proceed from here?

- The tool/characteristics mapping is maintained as a WWW page.
Do we think this is adequate?
- Development of schemas for storing/retrieving measurement data.
Who, when, with(in) which GGF groups?



Thank you.

<http://www-didc.lbl.gov/NMWG/>

